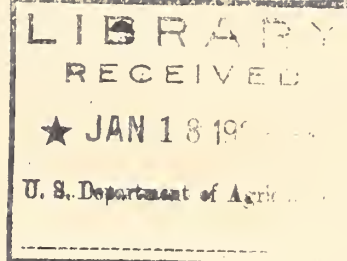


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RABBIT MANURE AS A FERTILIZER

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The proper use or sale of rabbit manure may well be an important factor in the success of the rabbit industry. In the dairy industry it has already been proved that in many instances where dairying was merely a means of livelihood, immediate and permanent success is assured when a change in policy is made and the manure is used to produce either more feed for the cattle or to be intelligently used on a money crop. In other words, in a region where dairymen are merely making a living, certain individuals who use cattle manure properly are financially and otherwise successful.

The use of animal manure has long been recognized as one of the most important means of keeping up the fertility of the soil and of obtaining maximum crop yields. Chemical analysis would indicate that manure has a comparatively low fertilizer value as compared with some of the commercial fertilizers, but it does not indicate the true agricultural value of manure. The average soil needs organic matter as well as nitrogen, phosphorus, and potassium. Animal manures and commercial fertilizers, therefore, are not necessarily competitors, but usually supplement and reinforce each other. In countries in which agriculture has been practiced continuously for any length of time, organic fertilizers, especially manures, have been used, even in ancient times. Anyone interested in this problem may read with profit the book of the late Professor F. H. King on the agriculture of China, entitled "Farmers of Forty Centuries."

At the present time in congested districts around big cities high prices are paid for animal manures, based on the returns from use on gardens. A product that was practically without commercial value a few years ago is now not only in great demand but brings such satisfactory prices that dairymen in some places often prefer to sell it to gardeners or suburbanites rather than to use it themselves.

Note.--This statement regarding rabbit manure as a fertilizer was prepared in the Bureau of Chemistry and Soils at the request of the Bureau of Biological Survey in order that correspondents might be given dependable information on the value of this product of rabbitries compared with other animal manures. The appended information on "California Conditions" was supplied by County Agent H. J. Wilder, of San Bernardino County, California.

The value of rabbit or any other manure depends largely on the character of the food fed to the animals. Where high-grade concentrated feeds are used, there will be a correspondingly better grade of manure produced. The rabbit, as raised under intensive conditions, is fed in such manner that the manure is certain to be of high grade.

It must be understood, however, that manure is a very variable product, depending not only on the character of the feed consumed but also on the age of the animal, its health, and other environmental conditions. The following table shows the fertility constituents in different kinds of manure:

Fertility constituents (in percentages) in different kinds of manure

Kind	Water	Nitrogen	Phosphoric acid	Potash
Sheep.....	59.52	0.768	0.391	0.591
Hog.....	74.13	.840	.390	.320
Cow.....	75.25	.426	.290	.440
Horse.....	48.69	.490	.260	.430
Hen.....	56.00	.8 to 2.00	.5 to 2.00	.8 to .9
Rabbit*.....	31.4	1.4	1.8	.5

*The sample of rabbit manure had dried out, as shown by the small quantity of water present.

It is fortunate that the same care that insures good feed and housing will also insure, in general, a good manure product. It will be interesting here to note the quantities of nitrogen, phosphoric acid, and potash present in some of the standard feeds:

Weight of nitrogen, phosphoric acid, and potash per hundred pounds of feeding stuffs

Feeds	Nitrogen	Phosphoric acid	Potash
	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>
Oats (grain)	1.98	0.81	0.56
Barley (grain)	1.84	.85	.74
Wheat (grain)	1.98	.86	.53
Alfalfa (green).....	.60	.15	.50
Alfalfa (hay)	2.33	.54	2.23
Clover (green)55	.15	.50
Red clover (hay).....	2.00	.39	1.63
Turnips.....	.22	.13	.29
Carrots.....	.19	.10	.27
Potatoes.....	.35	.12	.53
Cabbages.....	.35	.07	.29

One of the principal benefits derived from the use of manure comes from its large content of bacteria. These inoculate the soil and in this manner help to maintain the soil fertility. If proper care is not taken in preserving manure, however, bacterial action will immediately cause a loss of some of its valuable components. The value of manure is also commonly lost by allowing it to be exposed to the elements, the soluble material being leached out by rain. It should, therefore, be stored under cover and either used immediately or have some preservative added to it. One of the best of these is superphosphate (acid phosphate), which not only acts as a preservative but also increases the fertilizer value of the mixture. Manure is low in phosphoric acid, and the addition of superphosphate increases the quantity of this valuable chemical. A satisfactory proportion of superphosphate is 10 per cent of the weight of the manure. Gypsum is also a good preservative, but it does not increase the phosphoric-acid content. Kainit has been recommended where extra potash is required. (Kainit is a low-grade potash salt, usually containing from 12 to 16 per cent of potash.)

For intensive agriculture, manure is extremely valuable as a part of the compost pile. It not only adds to the fertilizer value of the compost, but it results in bacterial inoculation and supplies soluble nitrogen compounds. Many organic substances, inert in themselves, may by composting become available and useful in crop production.

In thickly settled communities, the question often arises as to whether it is better to use the home supply of manure or sell it. Where the producer has sufficient acreage and is either producing food for livestock or is growing cash crops, it may pay him best to use the manure on the home place. Under other conditions it may be more satisfactory to try to develop a local market for it. Where large quantities of manure are available, there is a third alternative, which consists in drying, grinding, bagging, and selling it for fertilizer. This has already been done successfully with sheep, cattle, goat, and poultry manures, and from its high nitrogen content should also pay in the case of rabbit manure.

Care should be taken in using rabbit manure on crops that are to be fed to rabbits, to prevent the possible spread of disease. Where this practice is followed, advice should be requested either from State or Federal authorities regarding proper precautions to take to prevent animals from becoming infected with parasitic or other diseases. Where coccidiosis is present in a rabbitry, it is not considered advisable to use the manure on any crops that will be fed to rabbits.

With the increasing population of the country and the growing need of intensive agriculture, the use of rabbit manure and its commercial value will probably increase, and one can predict that the proper care and the intelligent sale of rabbit manure will be an important factor in making the new industry successful and permanent.

California conditions

Conditions in the southwestern part of the United States, particularly in California, differ from those in other sections of the country. The extremely dry climate and very low rain fall are responsible for a low water content in the manure and its retaining practically all the nitrogen, phosphorous, and potash.

Analyses indicate that the composition of manures varies greatly, and that the average analyses are not necessarily safe to use as a basis for buying or selling. Rabbits fed on selected food, particularly alfalfa, hay, and grain, will produce high-grade manure, which, if carefully handled, will probably contain about .2 per cent nitrogen.

Composition (in percentages) of farm manures in California.

Kind	Water	Ash	Nitrogen	Phosphoric acid	Potash
Horse--					
Stable, partly rotted	55.0	18.0	0.50	0.35	0.70
Rotted in yard.....	34	44	.86	.65	1.41
Rotted under cover....	65	13	.78	.58	1.92
Fresh, without litter.	78	3	.21	.24	.14
Cow--fresh, without litter	82	3	.31	.26	.09
Chicken--fresh,.....	74	8	1.32	1.17	.46
Sheep--dry, ground.....	14	28	1.54-2.11	1.00-1.40	1.30-2.60
Goat--commercial dry.....	15	60	1.30-2.54	1.43-1.50	1.92-2.93
Rabbit	13	--	2.02	1.33	1.20

In general, rotted manures have lost much of their organic matter, with consequence increase in ash and in fertilizing constituents. The high ash content of most commercial unrotted manures is usually due to a mixture of the earthy material from yards or pens where the animals stood or the manure was stored.
